1 (presently amended). A method for providing for transport of thermal energy from an object, the method comprising:

providing an array of carbon nanotubes, referred to herein as "CNTs," on a selected surface of a selected substrate having high thermal conductivity, where at least first and second CNTs in the array are oriented substantially perpendicular to the selected surface;

filling at least a portion of an interstitial space between at least two adjacent CNTs in the array with a selected filler material that has high thermal conductivity so that the filler material makes contact with the selected substrate surface at a first end of each of the at least first and second CNTs and a second end of each of the at least first and second CNTs is exposed and is not fully covered by the filler material; and

causing the exposed second end[[s]] of [[the]] at least <u>one of the</u> first and second CNTs to make contact with a surface of an object for which transport of thermal energy is to be provided.

2 (original). The method of claim 1, further comprising causing said exposed second ends of said at least first and second CNTs to make contact with a surface of said object so that at least one of said exposed second ends of said CNTs bends or buckles.

3 (original). The method of claim 1, further comprising selecting said filler material to include at least one of Cu, Ag, Au, Pt, Pd and a metal-doped silicide.

4 (original). The method of claim 1, further comprising providing a layer of a selected catalyst, including at least one of Ni, Fe, Co, Pt and Al, for growth of said array of said CNTs, on said selected surface of said catalyst.

5 (original). The method of claim 1, further comprising filling said portion of said interstitial space with said filler material by a process comprising at least one of chemical vapor deposition, physical vapor deposition, plasma deposition, ion sputtering, electrochemical deposition and casting from a liquid phase.

6 (original). The method of claim 1, further comprising providing said exposed second ends of said at least first and second CNTs by a process comprising at least one of mechanical polishing, chemical-mechanical polishing, wet chemical etching, electrochemical etching and dry plasma etching.

7 (presently amended). Apparatus for providing for transport of thermal energy from an object, the ~~method~~ apparatus comprising:

an array of carbon nanotubes, referred to herein as "CNTs," on a selected surface of a selected substrate having high thermal conductivity, where at least first and second CNTs in the array are oriented substantially perpendicular to the selected surface;

a high thermal conductivity material that fills at least a portion of an interstitial space between at least two adjacent CNTs in the array so that the filler material makes contact with the selected substrate surface at a first end of each of the at least first and second CNTs and a second end of each of the at least first and second CNTs is exposed and is not fully covered by the filler material; and

wherein the exposed second end[[s]] of [[the]] at least one of the first and second CNTs make contact with a surface of an object for which transport of thermal energy is to be provided.

8 (original). The apparatus of claim 7, wherein said exposed second ends of said at least first and second CNTs make contact with a surface of said object so that at least one of said exposed second ends of said CNTs bends or buckles.

9 (original). The apparatus of claim 7, wherein said filler material includes at least one of Cu, Ag, Au, Pt, Pd and a metal-doped silicide.

10 (original). The apparatus of claim 7, further comprising a layer of a selected catalyst, including at least one of Ni, Fe, Co, Pt and Al, deposited on said selected substrate surface for growth of said array of said CNTs, on said selected substrate.

11 (original). The apparatus of claim 7, wherein said portion of said interstitial space is filled with said filler material by a process comprising at least one of chemical vapor deposition, physical vapor deposition, plasma deposition, ion sputtering, electrochemical deposition and casting from a liquid phase.

12 (original). The apparatus of claim 7, wherein said exposed second ends of said at least first and second CNTs are provided by a process comprising at least one of mechanical polishing, chemical-mechanical polishing, wet chemical etching, electrochemical etching and dry plasma etching.

13 (new). The method of claim 1, further comprising providing said exposed ends of said first and second CNTs in said array with an exposed first length and an exposed second length, respectively, that are not covered by said filler material, where the exposed first length and the exposed second length are substantially equal.

14 (new). The method of claim 1, further comprising providing said exposed ends of said first and second CNTs in said array with an exposed first length and an exposed second length, respectively, that are not covered by said filler material, where the exposed first length is greater than the exposed second length.

15 (new). The method of claim 14, further comprising causing said exposed second end of said first CNT to make contact with a surface of said object so that said exposed second end of said first CNT bends or buckles.

16 (new).. The method of claim 14, further comprising causing said exposed second ends of said first and second CNTs to make contact with a surface of said object so that each of said exposed second ends of said first and second CNTs bends or buckles.

17 (new). The method of claim 1, further comprising:

causing heat to be removed directly from said object for which transport of thermal energy is to be provided through said at least first and second CNTs; and

distributing a portion of the heat removed directly through said at least first and second CNTs to said filler material.

18 (new). The method of claim 1, further comprising providing for said transport of said thermal energy from said object with an associated thermal resistance of no more than about 8 cm^2-K/Watt.

19 (new). The method of claim 1, further comprising providing for said transport of said thermal energy from said object with an associated thermal resistance of no more than about 0.1 cm^2-K/Watt.

20 (new). The apparatus of claim 7, wherein said exposed ends of said first and second CNTs in said array have an exposed first length and an exposed second length, respectively, that are not covered by said filler material, where the exposed first length and the exposed second length are substantially equal.

21 (new). The apparatus of claim 7, wherein said exposed ends of said first and second CNTs in said array have an exposed first length and an exposed second length, respectively, that are not covered by said filler material, where the exposed first length is greater than the exposed second length.

22 (new). The apparatus of claim 21, wherein said exposed second end of said first CNT makes contact with a surface of said object so that said exposed second end of said first CNT bends or buckles.

23 (new).. The apparatus of claim 21, wherein said exposed second ends of said first and second CNTs make contact with a surface of said object so that each of said exposed second ends of said first and second CNTs bends or buckles.

24 (new). The apparatus of claim 7, wherein:

heat is removed directly from said object for which transport of thermal energy is to be provided through said at least first and second CNTs; and

a portion of the heat removed directly through said at least first and second CNTs is distributed to said filler material.

25 (new). The apparatus of claim 7, wherein said transport of said thermal energy from said object occurs with an associated thermal resistance of no more than about 8 cm^2-K/Watt.

26 (new). The apparatus of claim 7, wherein said transport of said thermal energy from said object occurs with an associated thermal resistance of no more than about 0.1 cm^2-K/Watt.

Respectfully Submitted,

John Schipper

Date: 14 October 2004

John Schipper

Patent representative for Applicants